**Activity: Role-play ethics and transgenics**

In this activity, students use role-playing to explore different stakeholders’ perspectives on the issue of using transgenic cows to make medicines to treat human diseases.

By the end of this activity, students should be able to:

* use a role-playing scenario to highlight the diversity of issues raised by people for and against the genetic modification of transgenic cows
* understand that ethical issues are often complex with no ‘right’ answer, but ethical deliberation can help us to make informed, justified decisions.

**Introduction**

The transgenic cows research programme at AgResearch is genetically modifying cows with human genes to produce new treatments for human diseases. In New Zealand, genetic modification is a controversial issue. A number of different groups have opinions on genetic modification. When considering an issue, it is important to explore a range of world views and respect diversity, for example, cultural, socioeconomic, and spiritual or religious diversity.

The regulations controlling genetic modification in New Zealand are strict. Any genetically modified (GM) plants or animals must be kept in containment – either in a lab or a controlled field trial. Before a research organisation can begin a field trial with a GM organism, they must apply for approval from the Environmental Protection Agency (EPA), formerly the Environmental Risk Management Authority (ERMA). The public can comment on these applications. You can see a list of all GM field trial applications since 1998 on the EPA website: <https://www.epa.govt.nz/industry-areas/new-organisms/rules-for-new-organisms/gm-field-tests/>

In this activity, students are divided into groups and encouraged to debate the issue of genetically modifying cows with human genes to help treat human disease. Each group will view the issue from the perspective of a different stakeholder.

**What you need**

* [Stakeholder roles](#roles)

**What to do**

1. Introduce the scenario: Scientists are planning to modify cows with a human gene in order to produce a protein that will be used to treat people with a rare form of cancer. Research has already shown that this is possible. You will represent a stakeholder group and argue your case at a meeting to determine whether or not these transgenic animals should be made. (Each stakeholder group will have a different set of principles and values they are using to look at the issue of modifying cows with human genes.)
2. Divide the class into small groups and give each a stakeholder role to play. The group should read the basic information about each stakeholder’s role and views and spend some time researching and discussing these views and the underpinning values and beliefs.
3. Have each group present the views of their stakeholder role to the rest of the class (the meeting). Allow time for questions and discussion.
4. Encourage the class to identify key issues about genetic modification that are raised by the stakeholder groups – human health, medicine, animal welfare, environment, cultural and spiritual perspectives, regulations and monitoring, economics and individuals’ rights.
5. Students should weigh up the arguments from each group and vote to determine the outcome. It may be helpful for them to ask questions like: What do we know? What do we value as good? What are the right things to do?

**RESEARCH SCIENTISTS**

Producing human proteins in cows’ milk is a safe way of making large amounts of protein in a form that will work best in people. The animals themselves do not suffer any adverse effects.

“The fear of genetic modification contamination is sensationalised by groups that exploit a lack of knowledge and uncertainty of new technology.” (Dr Jimmy Suttie, General Manager Applied Biotechnologies)1

**Considerations on transgenic research2**

* New Zealand has very strict rules on genetic modification.
* All GM field trials are contained and highly monitored.
* GM animals are not allowed to breed with non-GM animals.
* We use animals as a food source. Using them to make medicines for us is a logical next step that makes the most of modern genetic techniques.
* Transgenic animals (such as goats, sheep and cattle) can produce relatively large quantities of therapeutic proteins in their milk, so production is efficient and cost competitive.
* Producing proteins in animals is flexible. Animals can be bred as required, enabling production to be increased quickly to meet market demand. This is in comparison with cell culture systems, which require investment in expensive infrastructure in which to grow and maintain them in order to scale up production.
* The proteins produced are superior. Animals are able to produce highly complex proteins that cannot be produced by other systems. These proteins will closely resemble the protein produced naturally in the human body. In comparison, cell culture systems may not accurately reproduce the protein or may produce a non-active form of the protein.
* Large ruminant animals (such as goats, sheep and cattle) are used because they can produce significant amounts of milk in which the proteins can be expressed.

**Useful links**

1 AgResearch press release, 4 Sept 2008, quote from Dr Jimmy Suttie, General Manager Applied Biotechnologies, AgResearch. Retrieved from Scoop article on 11 April 2011.

[www.scoop.co.nz/stories/SC0809/S00015.htm](http://www.scoop.co.nz/stories/SC0809/S00015.htm)

2 Environmental Protection Agency (EPA), formerly ERMA, decision on AgResearch’s application to develop genetically modified goats, sheep and cows in containment.

<https://www.epa.govt.nz/assets/FileAPI/hsno-ar/ERMA200223/ERMA200223-ERMA200223-decision-FINAL.pdf>

**ENVIRONMENTAL ACTIVISTS**

(Examples include members of the Green Party or Soil Health Association of New Zealand.)

The Green Party remains committed to keeping the Aotearoa/New Zealand environment free of genetically engineered organisms – new information is constantly coming forward showing that the risks have been understated.1

“There are other ways to advance medicine and human health without crossing the species barrier and going into the strange brave new world of transgenic animals.” (Sue Kedgley, Green Party GE spokesperson)2

**Considerations on transgenic research**3,4

* It will harm our national identity and way of life.
* It will affect New Zealand’s clean green image.
* Increase animal suffering.
* Harm our environment, for example, through horizontal gene transfer (HGT) – the transfer of genetic material from one organism to another organism using a pathway that does not include parent to offspring reproduction.
* Risk of escape of GM cells or animals.
* Risk of entry for GM animals into our food chain.
* Risk of creating diseases in animals or in people consuming milk.

**Useful links**

1 Green Party and genetic engineering.

<https://www.greens.org.nz/search/content/genetic%20engineering>

2 Article on stuff.co.nz from Sue Kedgley, Green Party GE spokesperson, 15 April 2010.

[www.stuff.co.nz/science/3586981/AgResearch-granted-GE-research-approval](http://www.stuff.co.nz/science/3586981/AgResearch-granted-GE-research-approval)

3 Environmental Protection Agency (EPA, formerly ERMA) decision on AgResearch’s application to develop genetically modified goats, sheep and cows in containment.

<https://www.epa.govt.nz/assets/FileAPI/hsno-ar/ERMA200223/ERMA200223-ERMA200223-decision-FINAL.pdf>

**ENVIRONMENTAL PROTECTION AGENCY (EPA)**

The EPA (formerly the Environmental Risk Management Authority or ERMA) is responsible for regulating all research, development, importation, field testing and release of GM organisms. Its approval process is public, and public hearings are held on any applications to field test, conditionally release or release a GM organism.

“ERMA has approved research into the production of therapeutic proteins using

genetically modified bacterial and mammalian cells, mice, goats, sheep and cattle.

This approval is subject to stringent controls.”1

**Considerations on transgenic research**2,3,4

* The application is for a proper purpose.
* The beneficial effects of having the organisms in containment outweigh the adverse effects of the organisms.
* The GM organism can be adequately contained.
* Horizontal gene transfer is highly improbable.
* It is highly unlikely that GM cells or animals will escape and enter our food chain.
* It is highly unlikely that any new diseases will arise.
* The research will benefit New Zealand by increasing knowledge and capacity for innovation.

**Useful links**

1 Environmental Protection Agency (EPA, formerly ERMA) decision on AgResearch’s application to develop genetically modified goats, sheep and cows in containment.

<https://www.epa.govt.nz/assets/FileAPI/hsno-ar/ERMA200223/ERMA200223-ERMA200223-decision-FINAL.pdf>

2 Field tests and outdoor developments of genetically modified organisms from the Environmental Protection Agency (EPA).

<https://www.epa.govt.nz/industry-areas/new-organisms/rules-for-new-organisms/gm-field-tests/>

3 Genetically modified medicines – video clip.

<https://www.sciencelearn.org.nz/videos/1351-genetically-modified-medicines>

**SAFE (ANIMAL WELFARE ADVOCATES)**

SAFE is New Zealand’s national animal rights organisation that is actively involved in campaigns to protect the welfare of all animals. SAFE members are advocates for animals. Their view of our duty as human beings is to avoid harm to animals.

“Genetic modiﬁcation is experimental and has raised safety and cultural issues all over the world.”1

**Considerations on transgenic research**1,2

* GM animals are prone to increased levels of suffering.
* We want to minimise the use of animals in experiments, not increase them with new technologies like GM.
* There are alternatives for producing proteins.
* GM organisms will harm our environment.
* We risk creating new diseases in animals and people.
* The dignity of animals is not being respected by technologies like genetic modification.
* Using animals to meet human needs is morally wrong.

**Useful links:**

SAFE for Animals – genetic engineering

<http://safe.org.nz/search/node/genetic%20engineering> **NZBIO (BIOTECH BUSINESS REPRESENTATIVE)**

NZBIO is an organisation that represents and promotes biotechnology business.

“Bioeconomy is a significant contributor to New Zealand’s current and future economic well being.”1

**Considerations on transgenic research**1,2

* Transgenic cow research will increase scientific knowledge and the capacity for innovation in New Zealand.
* This will increase New Zealand’s reputation in the international science community.
* Research can contribute to new treatments and better or cheaper healthcare.
* Potential to contribute to market economy.
* New Zealand has strict regulations to protect human health and the environment.

**Useful links**

1 Environmental Protection Agency (EPA, formerly ERMA) decision on AgResearch’s application to develop genetically modified goats, sheep and cows in containment. <https://www.epa.govt.nz/assets/FileAPI/hsno-ar/ERMA200223/ERMA200223-ERMA200223-decision-FINAL.pdf>

**FEDERATED FARMERS**

Federated Farmers of New Zealand represents farmers’ business interests and encourages sustainability through best practice.

“Gene technology has the potential to benefit New Zealand producers, providing appropriate controls exist to ensure the safety of human health and the environment.”1

**Considerations on transgenic research**1

Federated Farmers:

* supports the principle and application of gene technology within agriculture, providing appropriate controls exist
* recognises that gene technology can provide benefits to New Zealand producers, including the potential for higher yields, precisely determined product attributes, higher quality and safer food, more sustainable environmental management practices, improved input efficiencies, better understanding of plant and animal functions, improved animal disease and plant pest management tools
* endorses individual farmers’ rights to determine what technologies are used in their production systems
* recognises and supports the regulatory frameworks established to scientifically assess and manage any risks to the health and safety of people and the environment from the application of gene technology
* recognises the consumer’s right to acquire information relating to the products they are purchasing – Federated Farmers encourages active risk communication by regulatory bodies and the supply of information by marketers to ensure consumer confidence
* recognises that gene technology involves significant issues of intellectual property – Federated Farmers wants to ensure that New Zealand has access to the benefits of this intellectual property.

**BIOETHICS COUNCIL**

Toi Te Taiao: the Bioethics Council was established in 2002 to review ethical issues raised by modern biological techniques. The Council was disbanded in 2009, but its documents are still available on the internet.

“The use of a human gene for the production of a single protein in the host organism does not raise sufficient cultural, ethical or spiritual reasons in itself to prevent this kind of use in plants and animals. However, ‘human genes’ are a culturally (although not scientifically) significant group, and their use in other organisms does require additional ethical considerations to those required for other genetic modifications.”1

**Considerations on transgenic research**1

* Benefits to people must outweigh any risks.
* What are the costs of not allowing transgenic research to continue? Will there still be benefits to medicine through improving knowledge and alleviating human ills?
* Animal welfare is important.
* All genes are made of the same chemical material – DNA – and human genes are often similar to genes found in other organisms.
* GM animal research creates additional issues because of the various perceptions of

genetic modification as unnatural or ‘playing at being God’.

* Horizontal gene transfer has not been demonstrated.

**MĀORI/IWI REPRESENTATIVES**

Māori share the concerns of other groups. Māori and other indigenous peoples are increasingly raising concerns about the misappropriation of indigenous knowledge and the use of genetic resources by biotechnology companies.

**Considerations on transgenic research**1,2,3

* Māori have strong objections to gene technology because it is seen as a breach of their belief systems and therefore as a moral and cultural offence.
* Genetic modification is inconsistent with mātauranga (knowledge and learning) and tikanga Māori (principles and values) placing Māori and their whakapapa (links to family and relationship to the natural world) at unnecessary risk.
* Need to protect taonga and ensure research does not include Māori genes.
* Wider and more thorough consultation, sharing of benefits and the ability to maintain intellectual property rights.
* The application of the genetic modification is important to Māori and may influence their opinion.
* There is a need for Māori involvement in decision-making if genetic modification does proceed.

**Useful links:**

1 Genetically modified medicines – video clip.

<https://www.sciencelearn.org.nz/videos/1351-genetically-modified-medicines>

**PARENTS OF A CHILD NEEDING TREATMENT**

In general, people find genetic modification of organisms more acceptable when it is being used to treat human diseases or reduce suffering. Insulin is an example of a treatment that is a product of a genetically modified organism. Insulin is used by thousands of people in New Zealand to alleviate symptoms of diabetes.

“It’s about trying to make sure that families in the future who are affected by these diseases have better options, better outcomes and more therapies available to them.”(John Forman, Executive Director of the New Zealand Organisation for Rare Disorders)1

**Considerations on transgenic research**1

* A moral imperative to find treatments for rare diseases.
* The use of technology for personal health is an issue of individual choice, as long as there is careful research into therapies and they are rigorously tested and clearly labelled.
* Genetic modification is an acceptable risk when used to treat human diseases and reduce suffering.
* It is the government’s responsibility to ensure new technologies are safe for our health and wellbeing and for the environment in New Zealand.

**Useful links**

1 Hopes pinned on GM milk, NZ Herald, 3 April 2010, retrieved on 11 April 2011 [www.nzherald.co.nz/chris-barton/news/article.cfm?a\_id=36&objectid=10635968](http://www.nzherald.co.nz/chris-barton/news/article.cfm?a_id=36&objectid=10635968)

**RELIGIOUS GROUP**

Religious groups will have many different perspectives. From the perspective of Christian beliefs, we have a role in caring for the creation that God has provided for us.

**Considerations on transgenic research**1

* In looking after the created world we must proceed to the best of our abilities.
* Justice is central to Christian ethics and follows from the command to love your neighbour as yourself.
* The concept of unconditional love is central to the Christian gospel. The Christian message has a particular emphasis on caring for the poor, the helpless and the vulnerable.
* There is also an understanding that we should do good without doing harm in contrast to a utilitarian approach where harm may be permissible if it is for the greater good.
* There is also a principle of respect for the integrity of the Earth and its creatures and restraint in our use of power to achieve what we think best without regard for traditional safeguards and mysteries – indicated by the Pākehā word ‘sacred’ and the Māori word ‘tapu’.

**Useful links**

1 Transgenics: A perspective from the Interchurch Bioethics Council. <http://www.interchurchbioethics.org.nz/index.php/resources/>